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ABSTRACT

A 40-item nonsense word list was administered to 27 first-graders who had been taught letter-sound correspondences in isolation. The results displayed a succession of stages through which subjects apparently passed. At the second stage, subjects could sound letters but not blend the sounds into words; at the third stage, subjects could sound some letters and blend them into a word; and at the fourth stage, the subjects pronounced most of the items at sight. The fourth stage subjects were significantly more accurate at pronouncing eleven predictable items, pronounced the entire list faster, and scored significantly higher on the reading subtest of the Metropolitan Achievement Test both one and two years later when compared with the third stage subjects. Subjects' overall speed on the list as a first- grader was a significant predictor of their rank on the Metropolitan Achievement Test in second grade and in third grade. The researcher feels that written language can be mapped onto spoken language, contrary to the view of some psycholinguists. (MKM)

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ABSTRACT

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Sounding, Blending and Psycholinguistics

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A 40-item nonsense word list was administered to 27 first-graders, who had been taught letter-sound correspondences (LSCs) in isolation.

The results displayed a succession of stages through which Ss apparently passed. Ss at Stage III knew some LSCs, and could blend them into a word. Stage IV Ss pronounced most of the items at sight.

A comparison between 17 Stage III and IV Ss revealed that Stage IV Ss were significantly more accurate at pronouncing eleven predictable items; pronounced the entire list significantly faster; and scored significantly higher on the reading subtest of the Metropolitan Achievement Test (M.A.T.) both one and two years later. An S's overall speed on the list was a significant predictor of his rank on the M.A.T. in second grade ($p < .05$) and in third grade ($p < .01$).

An alternate view is proposed to that currently held by many psycholinguists. It is argued that written language can be mapped onto spoken language, and that the only obstacle to the child's comprehension of written language is his failure to grasp the graphemic system. Teaching this system directly can prove, for some children, very efficient.

CS 006 281

Sounding, Blending and Psycholinguistics

by

E. Jennifer Monaghan

There is currently, in many quarters, oppostion to any phonic approach which teaches children to "isolate the sound of the letters" (as the saying goes), and to then synthesize a succession of sounds into a whole word. This is the approach generally known as a "synthetic phonics" method.

The late William Gray, one of the outstanding figures of his era, wrote sternly that a child should not "establish the habit of thinking of sounds in isolation rather than as parts of a word whole (3, p. 41), while the famous linguist Leonard Bloomfield, who disagreed with Gray on almost every other point, fully agreed with him on this. Isolating the sound of a letter, as /t/. wrote Bloomfield, was "bound to confuse (the child's) response to the printed signs" (1, p.26).

The problem at issue is well summarized by McCracken and Walcutt, authors of Basic Reading (4), who are, of course, well-known advocates of a systematic phonics approach: "Many teachers wonder whether the mechanical process of 'sounding out' a strange word will not interfere with a child's ability to attend to its meaning. They know that a child may have trouble putting two isolated sounds together, and they fear that the struggle may drive all thought of meaning out of his mind " (ibid., p. vii).

This point of view has recently received fresh and powerful support from a new quarter: the psycholinguists.

Reading, they argue, is much more than mere decoding. Written language is not merely speech written down. The reader takes part in a psycholinguistic guessing game, using semantic and syntactic clues as well as graphemic ones. This group of psycholinguists has found its most articulate spokesman in Frank Smith, who has drawn a moral for the teaching of reading: the teaching of letter-sound correspondences to children is neither necessary nor efficient (5).

In the face of this interdisciplinary opposition, the rise and commercial success of programs that espouse precisely this kind of instruction (Open Court, for example, or Distar) is both unexpected and interesting. It seemed worthwhile to investigate this kind of phonic approach, focusing on two aspects.

In the first place, we should examine what the approach professes to teach children. As it claims to teach letter-sound correspondences (LSCs) directly, let us give our subjects a task that requires them to produce letter-sound correspondences, shorn of all syntactic or semantic clues, and see how they fare.

Second, armed with the information that we have gained from examining our subjects' grasp of LSCs, we can then try to see if there is a relationship between their grasp of LSCs and their ability to read in the true sense of the word -- that is to say, with comprehension.

Moreover, it would seem important to relate these factors over a period of several years: the study should be longtitudinal in nature.

It is plausible to argue that a mastery of letter-sound correspondences may best be measured by asking children to read English words they have never met before. A good way of ensuring that words are new to children is to make them up oneself. A 40-item list of "synthetic" words (or nonsense syllables) had been devised by the Wisconsin researchers Calfee, Venezky and Chapman to test the ability of both children and adults to use letter-sound generalizations in pronouncing unfamiliar words (2) (Table I). While some of the items could theoretically be pronounced in several ways (_theat_, for example, could, within the bounds of English orthography, be pronounced to rhyme with either _treat_ or _great_), eleven of the items were "predictable," in that they exhibited a pattern whose pronunciation the child could predict from its constitutent letters with great certainty. The first of these patterns was the Vowel-Consonant-_e_ pattern, in which the _e_ is "silent," and the preceding vowel "lengthened" (e.g. _gafe_). The second pattern was that of _c_ followed by either _e_ or _i_, in which _c_ represents /s/ (e.g. _acil_). Items in the third pattern displayed a _c_ followed by _a_, _o_ or _u_, in which _c_ would be pronounced /k/ (e.g. _cose_). It was decided that the whole of the 40-item list should be used to get a general idea of subjects' grasp of letter-sound correspondences. Their pronunciation of the eleven predictable items would be analysed in more detail.

The ability of the subjects to understand what they read had, of course, to be judged on other criteria. In the first grade, standardized tests are not normally administered by the school. At this grade-level, then, the only evaluation could be that of the subjects' classroom teacher, who would divide them into good (Hi) readers and poor (Lo) readers. For those subjects still in school at the end of the second and third grades, the total reading score on the Metropolitan reading tests would be used.

It seemed important to select first-graders as subjects for this experiment, becuase the difference between conventional teaching and the direct teaching of letter-sound correspondences is most marked in the first year. The phonics method selected was the Spalding method (6). In this approach, the letters are presented to the children as sounds, with alternate pronunciations being given to letters or combinations of letters, where these represent more than one sound in English. For example, Spalding presents A as /æ/, /e/, /a/; B as /b/ (inevitably with a schwa); C as /k/, /s/. Words are not taught as sight words. Instead, children exposed to the method are shown how to use their knowledge of the sounds of the letters to "sound out" a word, and then combine the sounds into a whole word. Rules are taught as words are presented to the children for writing. A final e in the word home, for example, would be presented as a "final silent e, which makes the o say o."

Subjects

The subjects selected for the experiment comprised an entire first-grade class from a public elementary school in Brooklyn, New York. The whole class had been instructed in Spalding by the same teacher and educational assistant for eight months. The experiment was run in May, 1972. The subjects were twenty-nine in number, and represented a large social and economic range, from children on welfare, children who spoke only Spanish in their homes, to children whose parents were of professional status. In view of the age of the children, participation in the experiment was voluntary, but every child in the class volunteered once and some were with difficulty restrained from volunteering twice!

Method

The forty synthetic words composed by Calfee, Venezky and Chapman (Table I) were hand-lettered on 3 x 5 index cards, in lower-case letters. One random order was prepared. Five pre-training items were used: thook, sipe, poul, waik and fien.

Each S was brought to an experimental room (a small office in the school, which had been set aside for the experiment), and shown by the experimenter how to speak into the microphone of a Craig transistor (Model 212) tape recorder. He or she was then told to practice reading five pre-training items; he was informed that these were "fake" words (a term devised by the subjects themselves), and warned to watch out for "two-letter

phonograms." (In the classroom situation, the teacher underlined sets of graphemes that represented one phoneme: e.g. coat, thing, so that a presentation without underlining presented additional difficulties for the subjects.) After hearing the training items replayed, S was presented with the stack of 40 cards, on which the synthetic words were lettered. Presentation was S-paced, the S removing one card, after he had pronounced it, to reveal the card underneath. Overall time was recorded for the pronunciation of the forty items. Each subject was identified by a number, which was recorded on the tape. Pronunciation of each item was recorded manually, and subsequently verified from the tape recording.

In the first grade, the classroom teacher's evaluation of the Ss as "good" or "poor" readers was recorded. The scores made by Ss still in the school at the end of second grade, on the total reading subtest of the Metropolitan Achievement Test, were recorded. The third grade scores were similarly recorded.

Results

The results can only be adequately interpreted in terms of how the first grade Ss approached their task. There was a uniformity about this that was impressive: they conceived of their task as that of sounding out the words." Their success in doing so, however, differed dramatically. This, in turn, seemed to be related to what they had, or had not, been able both to learn and apply.

First, there was the one child in the sample who knew no letter-sound correspondences. She gave a "real" word in response to every synthetic word. Let us call this "Stage Zero."

Next, there was the child who had a grasp of letter-sound correspondences, but who did not know that he had to sound them out. There were no Ss who fell into this category, but logically it should be termed Stage I.

Thirdly, there was the child who had a grasp of letter-sound correspondences, and who knew that he had to sound them sequentially, but who could not produce a whole word that bore any relation to the isolated sounds he had just pronounced. Three of the Ss fell into this category (Stage II).

Fourthly, there is the child who can pronounce the sounds, and who can synthesize them into a whole word. Fifteen Ss fell into this category. They varied considerably in the length of time they took to do this (Stage III).

Lastly, there came a group of children, nine in all, who did something that was qualitatively different. These subjects reeled off the large majority of the synthetic words at sight, without sounding them out. They fall into "Stage IV."

For the purposes of the experiment, subjects who fell into the categories of Stages Zero, I and II could not be said to have learned LSCs, and were discarded from the sample. Seventeen subjects from Stages III and IV were still in school the

following year (8 from Stage III, and all 9 of the original Stage IV Ss).

The results of the experiment are shown in Table II. Subjects have been ranked according to the overall time taken to pronounce the 40-item synthetic word list. As can be seen, the speed varied greatly, from a nippy one minute-thirty seconds to almost seven minutes.

The first result examined was the number of correct pronunciations made on the eleven predictable items cabe, clase, gafe, lethe, cipe, cofe, cose, cune, cerp, acil and acol. No subject pronounced all eleven items correctly. There were three items exhibiting the c followed by e or i pattern: cipe, cerp and acil. Only three subjects (all from the group designated the "Hi" group by the classroom teacher) pronounced the c correctly as /s/, and then only once each. Overall, however, the Wilcoxon Rank Sum test revealed that the Hi group was significantly more accurate than the Lo group in their pronunciation of the eleven predictable items ($p < .025$) (Table III). Moreover, if we look at the subjects from the point of view of the Stages previously outlined, Ss who had reached Stage IV were also significantly more accurate than those who had only reached Stage III ($p < .05$).

The relationship between Stages, as defined earlier, and the general ability of the children in reading, as evaluated by the classroom teacher, should be noted. All Stage IV children were also in the Hi group. Not all Hi group children, however, had reached Stage IV. Two were still at Stage III.

The relationship between pronunciation and meaningful reading was then investigated. The Ss' scores on the Metropolitan Achievement Test, which they took in second grade, were ranked, and correlated by Spearman's rank order correlation with their ranking on the scores they had made on pronouncing the eleven predictable items. The results did not begin to approach significance. Mere accuracy of pronunciation, in other words, was not a sensitive predictor of subsequent reading performance. As noted earlier, however, the good readers (Hi) in general were significantly more accurate than the poorer readers (Lo).

The results were examined from the point of view of the rapidity with which the subjects had pronounced the synthetic word list as a whole. This had not been thought particularly important when the test was designed, but it seemed as if the better readers (those from the Hi group) went through the list faster than the Lo readers.

A Wilcoxon rank sum test revealed that Stage IV children had pronounced the synthetic word list significantly faster than Stage III subjects ($p < .001$). Given our definition of Stages III and IV, this result should not raise any eyebrows: of course children who can read words at sight do so faster than children who have to sound them out laboriously!

Secondly, the 15 subjects were ranked on their results on the Metropolitan Achievement Test in second grade (May 1973). The performance of Stage III subjects on that test was again compared with that of Stage IV subjects. A Wilcoxon rank sum test showed that Stage IV subjects scored significantly better than the Stage III Ss on the M.A.T.: $p < .025$.

Finally, the length of time subjects took to pronounce the synthetic word list was compared with their ranking on the Metropolitan Achievement Test in second grade. Spearman's rank order correlation was found to be .601 ($p < .05$). That is, the speed with which a subject had pronounced a list of meaningless words in first grade was a powerful predictor of his rank on a test of meaningful reading, one year later. The faster a child had pronounced the list, the higher his score on the M.A.T. All Stage III and Stage IV subjects were on grade level or above. The scores ranged from 2.9 to 6.9 (median: 3.6)

The correlations were repeated when the results of the third-grade Metropolitan Achievement Test were obtained. Once again, Stage IV children did significantly better than Stage III children on the M.A.T. ($p. < .01$). The ranking on the speed of pronunciation of the synthetic word list was a highly significant predictor of the ranking on the third-grade M.A.T., this time at the .01 level of significance ($\rho = .751$, $p < .01$). All Stage IV children read comfortably above the grade level of 3.9: their grade equivalents ranged from 4.5 to 9.6. This time, however, the position of Stage III children was not so satisfactory: three were below grade level, one was at grade level, and three were above. The precision of prediction was such that the first-grade subject who took the longest to pronounce the synthetic word list obtained the lowest reading score of all the subjects, 3.2, and the fastest subject obtained the highest score, 9.6 -- two years later.

Conclusions

This experiment must be regarded as a pilot study, since the subjects were not randomly selected and the numbers were small. Nonetheless, it is possible to draw a few conclusions.

First, there is nothing in this study to contradict the results Venezky obtained when he tested a sample of 240 Finnish children with synthetic words based on Finnish orthographical patterns (7). He found that accuracy of pronunciation alone did not correlate significantly with the subjects' overall reading abilities, as rated by their teachers. His conclusion was that correct pronunciation did not guarantee good reading, although the reverse was probably true: that is, inaccurate pronunciation did correlate with poor reading. In the present study, better readers did have a better grasp of LSCs, as did the third graders in the original experiment with the synthetic word list conducted by Calfee, Venezky and Chapman (2).

The present study indicated that even good readers in the first grade have a poor grasp of the pronunciation of c followed by e or i. This was also the finding of Venezky and Johnson (9), when they studied 73 children in grades one through three. These researchers considered that there were two causes for this: insufficient instruction, and insufficient exposure to words exhibiting the pattern. (Once you have exhausted cent and city, there are few words in primary readers displaying c as /s/.) The failure to grasp c as /s/ by our sample was particularly interesting, since the children had actually been taught c as /k/, /s/.

This confirms what we have known for a long time: it is not enough to learn something -- knowledge must be put to use to be functional.

One of the most interesting aspects of this study is the identification of Stages that children apparently pass through when LSCs are taught directly. What the teacher taught had been the same for all the children. What the children learned clearly depended upon the child. It was no mere coincidence that the children of high socio-economic status were, for the most part, the ones that reached Stage IV.

The performance of Stage IV children needs some elaboration. These were first graders who were able to reel off the greater part of a list of 40 nonsense syllables at sight. They had apparently internalized the sound-symbol system of the English language. The question arises as to whether they had perhaps always been at Stage IV. Their teacher, when asked about this, reported that Stage IV children -- just as Stage III children were still doing -- had initially struggled through words sound by sound.

One of the fears, quoted above, of opponents of the direct teaching of LSCs is that "the struggle (to put isolated sounds together) may drive all thought of meaning our of (the child's) mind." But for those children who had reached Stage IV, the whole issue is side-stepped. They no longer had to struggle to blend sounds.

Far and away the most unexpected result of the present study was the predictive power of the overall speed of pronunciation of the synthetic word list. As we have seen, the faster a child nipped through the list, the better he or she did one and two years later on a test of meaningful reading. It appears that the speed of pronuncation of the synthetic word list taps some kind of more generalized ability.

The concept of stages is also potent. The Stage IV children did better than the Stage III children on every count. They were more accurate in their pronunciation, they went through the synthetic word list faster, and they scored higher on the M.A.T. in two successive years.

The ability to read fast is, of course, useful in a timed test such as the M.A.T., but there must be more to it than that. If we regard the synthetic word list as tapping a grasp of LSCs, and the overall speed as the child's ability to understand graphic symbols, perhpas we can explain the results. For a really satisfactory explanation, however, we need to consider another view of learning to read than that provided by Smith and his colleagues.

This view would go something as follows. Like Smith, we would hold that the child comes to school with the most powerful and remarkable of equipment: a grasp of the phonology, syntax and semantics of his own language. Unlike Smith, we would hold that whatever happens to the fluent reader, the beginning reader somehow has to map written language onto the only form of language he knows so far, his own spoken language; and that an efficient

way of doing this will be to teach the learner how the graphemes relate to his own phonology. This in turn implies a different view of the nature of English orthography from that apparently held by some psycholinguists: it implies that we hold, with Venezky (whose The Structure of English Orthography is widely regarded as definitive), that English orthography "is not merely a letter-to--sound system riddled with imperfections, but instead, a more complex and more regular relationship wherein phoneme and morpheme share leading roles" (8, p.11). And we would agree with Noam Chomsky -- from whom Smith claims to derive his theories -- that the English orthographic system is near-optimal.

This view would hold that the only obstacle to the child's understanding the written language is his failure to grasp the graphemic system. Once he has grasped this, he can use the ability he already has to monitor and refine any ambiguities that arise from the graphemic system.

For example, when confronted by the sentence, "Father said to Dick, 'I am going to give you a treat,'" he can use his own grasp of syntax and semantics to pronounce treat as /trit/ rather than /tret/. He will not, however, use his grasp of syntax and semantics to predict an endless variety of desirable nouns such as "puppy," "surprise," "candy" or "tricycle."

Whichever view ultimately wins out, we can, on the basis of this study, at least suggest that the teaching of LSCs directly proved, for some children, extremely efficient.

Table I. Experimental Words Classed According to Spelling Patterns

# Final e	# Initial and medial c	Vowel Digraph			Miscellaneous s	Miscellaneous ch
cabe	cabe *	baig	theat	yook	thaus *	chait *
clase	cofe *	kaip	peaz	shoog	cose *	chung *
gafe	cose *	chait	veeg	voop	clase *	chal
lethe	cune *	thaid	neem	poup	th	moch
cipe	cerp	dauk	leek	houm	thaus *	gh
cofe	cipe *	laum	sheip		theat *	ghin
cose	acol	kaut	vieb		thaid *	ghim
cune	acil	thaus	yiet			ghal
			mien			final-c
						roc

* Indicates words enteringinto more than one spelling pattern comparison.

# Indicates patterns regarded as "predictable," in that a final -e regularly lengthens the preceeding vowel in the vowel consonant -e pattern, and c is pronounced /k/ before a, o or u, /s/ before e or i.

TABLE II: RESULTS

Stage	Identification Number of S	First grade (1972) overall time on pronunciation of synthetic items (minutes . seconds)	Number of correct pronunciations of predictable items (out of 11)	1972 First grade assessment by teacher (Hi or Lo)	May 1973 Second grade score on M.A.T.	May 1974 Third grade score on M.A.T.
III	15	6.50	4	Lo	3.3	3.2
III	14	5.15	4	Lo	2.9	4.4
III	2	4.32	6	Hi	3.6	4.6
III	19	4.26	6	Lo	3.1	3.6
III	21	4.22	2	Lo	3.5	3.7
III	13	4.13	6	Lo	4.3	---
III	23	3.59	5	Lo	3.3	3.9
III	18	3.17	7	Hi	4.1	5.3
					median: 3.4	median: 3.9
IV	5	2.54	2	Hi	6.0	6.2
IV	17	2.46	8	Hi	3.5	4.5
IV	8	2.38	8	Hi	4.3	4.6
IV	12	2.20	8	Hi	3.4	4.9
IV	7	2.16	6	Hi	3.3	4.6
IV	3	2.10	9	Hi	6.9	8.4
IV	16	1.53	8	Hi	4.1	8.4
IV	4	1.39	5	Hi	5.2	8.4
IV	6	1.34	6	Hi	5.2	9.6
					median: 4.3	median: 4.9

Table III

First grade results
Pronunciation of eleven predictable items on synthetic word list

Wilcoxon Rank Sum test between scores made by Hi and Lo groups:

Lo, $N_1 = 6$ $\sum N_1 = 32 < \bar{R}_1 = 54$ $p < .025$

Hi, $N_2 = 11$

Wilcoxon Rank Sum test between scores made by Stage III and Stage IV Ss:

Stage III, $N_1 = 8$ $\sum N_1 = 53 < \bar{R}_1 = 72$ $p < .05$

Satge IV, $N_2 = 9$

Speed of pronouncing the entire 40-item synthetic word list

Wilcoxon Rank Sum test between Stage III Ss and Stage IV Ss:

Stage III, $N_1 = 8$ $\sum N_1 = 36 < \bar{R}_1 = 72$ $p < .001$

Stage IV, $N_2 = 9$

Second grade results
Ranking of scores on Metropolitan Achievement Test

Wilcoxon Rank Sum test between ranks of Stage III Ss and Stage IV Ss:

Stage III, $N_1 = 8$ $\sum N_1 = 50.5 < \bar{R}_1 = 72$ $p < .025$

Stage IV, $N_2 = 9$

Third grade results
Ranking of scores on Metropolitan Achievement Test

Wilcoxon Rank Sum test between Stage III Ss and Stage IV Ss:

Stage III, $N_1 = 7$ $\sum N_1 = 35.5 < \bar{R}_1 = 59.5$ $p < .01$

Stage IV, $N_2 = 9$

Correlations between overall speed of pronunciation of synthetic word list and ranking on Metropolitan Achievement Test

Correlation between speed of pronunciation and Second Grade M.A.T.:

Spearman's Rank order $N = 17$ $\sum d^2 = 326$ $\rho = .601$ $p < .05$

Correlation between speed of pronunciation and Third Grade M.A.T.:

Spearman's Rank order $N = 16$ $\sum d^2 = 169.5$ $\rho = .751$ $p < .01$

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